Eye injuries and eye protection in sports

A position statement from the international federation of sports medicine (F.I.M.S.)

The International Federation of Sports Medicine calls attention to the fact that, while eye injuries in sports are relatively frequent, they are almost completely preventable. Loss of sight, even in one eye, involves changes in lifestyle for the individual and serious financial and social consequences both for the individual and for society as a whole. It is imperative that sport eye injury risk be reduced to as low a level as possible by enforcement of existing safety rules or by rule changes, where applicable. All athletes should be prescribed eye protectors where appropriate to the sport.

Sports can be classified on the basis of low risk, high risk, and extremely high risk for eye injury. Most sports that pose risk for unprotected eyes can be made quite safe with the use of appropriate protective devices. Eye examination and counselling should play an important part in the screening physical examination for every athlete prior to sports participation. The athlete deserves a careful explanation of the risk of eye injury, both with and without various types of eye protectors in the proposed sport. Athletes who are functionally one-eyed must have their status diagnosed and appropriate eye protection prescribed.

Glass lenses, ordinary plastic lenses, and open (lenseless) eyeguards do not provide adequate protection for those involved in active sports. In many situations, their use can increase the risk and severity of eye injury.

Contact lenses should only be worn in combination with other recommended sport eye protectors.

Eye injury risk in sports

Eye injury risk is almost totally related to the particular type of sport[1,2]. Low risk sports do not involve a thrown or hit ball, a bat or a stick, or close aggressive play with body contact. Examples include track and field, swimming, gymnastics, canoeing, and rowing.

Sports with high risk of eye injury (when protective devices are not being worn) involve a high speed ball (or puck), the use of a bat or stick, close aggressive play with intentional or unintentional body contact and collision, or a combination of these factors. Examples include hockey (ice, field and street), the racket sports (racquetball, squash, tennis, badminton), lacrosse (men and women), court handball, baseball, basketball, football (US, Canadian, Australian), soccer, and volleyball[3,4,5]. The incidence of serious eye injury in these sports is a source of great concern, but adequate eye protection devices are available[6,7,8,9,10].

Sports involving extremely high risk for eye injury are the combative sports such as boxing and full-contact karate[11,12] for which effective eye protection devices are not available. The functionally one-eyed athlete should be strongly advised against participation in such sports.

Other risk factors

It is suspected but not yet proven that risk for eye injury may also be related to physical development, skill level, and existing visual impairment. Coordination, balance, reaction time, speed and strength are physical characteristics that are not well developed in young athletes, possibly making them more vulnerable to injuries. It is believed that beginners are more prone to injuries than are intermediate or advanced players because beginners have not yet learned or refined the necessary skills to master the sport. However, in such sports as hockey and racquetball, highly skilled athletes play a faster game with more aggressiveness, and thus, may be subject to a higher eye injury risk than other participants.

Any eye condition that could be made worse if the eye were to be struck places the athlete at increased risk of serious eye injury. Athletes with retinal degenerations, thin sclera, prior eye surgery (including radial keratotomy), or prior serious eye injury should seek consultation with an ophthalmologist before participating in a sport.

The functionally one-eyed athlete

Sports participants with only one good eye are at particular risk since a serious injury to the good eye could leave the person with a severe visual handicap or permanently blind. Any person with good vision in only one eye should consult an ophthalmologist on whether or not to participate in a particular sport. **If a decision is made to participate, then the person should wear maximum protection for the particular sport for all practice sessions and for competition.**

A person is also functionally one-eyed when loss of the better eye would result in a significant change in lifestyle due to poorer vision in the remaining eye. There is no question that a person with 20/200 or poorer best-corrected vision in one eye is functionally one-eyed since loss of the good eye would result in legal or total blindness, with its attendant burden both to the individual and society. On the other hand, ophthalmologists believe that most persons with one eye function see quite well with 20/40 or better vision in that eye.

Every athlete who tests less than 20/40 (with glasses, if worn) on the screening examination should be evaluated by an optometrist or an ophthalmologist to determine if the subnormal vision is simply due to a change in refraction. If the best-corrected vision in either eye is less than 20/40 after refraction, ophthalmological evaluation to obtain a definitive diagnosis of the visual deficit is indicated. If the athlete is functionally one-eyed, the potential serious, long-term consequences of injury to the better eye should be discussed in detail.

Eye protectors

Most eye (and face) injuries could be prevented or, at least, the effects of such injuries minimized by using protective eyewear. Normal 'streetwear' eyeglass frames with 2 mm polycarbonate lenses give adequate, cosmetically acceptable protection for routine use by active people. Such protective glasses are recommended for daily wear by the visually impaired or functionally one-eyed athlete. They are also satisfactory for athletes in competition who wear eyeglasses and participate in low risk sports.

Moulded polycarbonate frames and lenses (plano/non-prescription protective eyewear) are suggested for contact lens wearers and athletes who ordinarily do not wear glasses but participate in moderate to high-risk, non-contact sports (e.g. racket sports, baseball, basketball). They can be used in combination with a face mask or helmet with face protection for additional protection in high risk contact or collision sports. Such protective glasses are recommended to the functionally one-eyed athlete who does not require prescription protective eyewear in the good eye to be used in combination with a face mask and helmet for higher risk contact sports. Face masks or helmets with face protection are required for use in the high risk contact or colli-

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sion sports (ice hockey, US football, the baseball catcher). The face mask may consist of metal wire, coated wire, or a transparent polycarbonate shield.

When protective eyewear has been employed in racket sports and face protection devices employed in hockey, eye injuries have been eliminated[10,13].

Routine examination

Practitioners providing medical screening for athletes should have facilities for vision testing and basic eye examination at their disposal and be aware of both the basic principles of eye protection in sports and the available eyewear. It is recommended that athletes have their vision tested and eyes examined on a regular basis. Vision or eye problems are best corrected by an eye care specialist when detected early. An examination also offers an opportunity to discuss any sports vision needs and the most appropropriate type of protective eyewear.

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Appendix

Eye and face protector standards

Racket Sports (Sports frame and sports eyeguards)

ATSM Z803-86 Eye protection for use by players of racket sports

CSA P400-M 1982 Racket sports eye protection, preliminary standard

Hockey

ASTM F513-86 Eye and face protective equipment for hockey players

CSA CAN 3-Z262.2-M78 Face protectors for ice hockey and box lacrosse players

Baseball

ASTM F910 Qualifications for faceguards for youth baseball

Skiing

ASTM F659 Specifications for eye protective devices for alpine skiing

ASTM American Society of Testing and Materials

CSA Canadian Standard Association

Blood doping

A statement from the Medical Commission of the International Olympic Committee

Initial rumours on potential use of blood withdrawal and reinfusion with the aim of improving performance in endurance events arose after the 1976 Olympic Games in Montreal. Since then, this method and possible ways of detection have been subject to serious concern by the IOC Medical Commission.

The practice was banned for the 1988 Olympic Games in Calgary and Seoul although a reliable method for detection does not yet exist.

The IOC has partially financed recent research performed by specialists in Sweden who have endeavoured to find a way to prove that the blood haemoglobin content of an athlete has been manipulated. The first results showed that 50 per cent of blood-doped athletes could be detected if a minimum of two blood samples could be analysed before and after competition. This is certainly a step forward in the right direction, but the reliability and the validity of this test are still too low for its application during Olympic Games, where doping control should never result in false positive or false negative results.

Other methods based on the simple determination of haemoglobin concentration in the blood of participating athletes would certainly disqualify innocent individuals having high values due to genetic influences, living or training at high altitude, etc.

For the moment, careful examination of the medical equipment of teams entering a country and inspection of potential injection marks on the athlete's body seem to be the only possible ways of preventing blood doping. No blood products were reported by Canadian customs before the XVth Olympic Winter Games in Calgary and no evidence of recent blood transfusion has been detected by members of the IOC Medical Commission when inspecting the athletes undergoing the normal procedure of medical control after competition.

Unconfirmed reports regarding the possible use of the newly developed hormone erythropoetin (EPO) to increase the number of red cells and the haemoglobin concentration in the blood of athletes should be qualified as pure speculation at the present time. EPO is available at this stage from only a limited number of sources for clinical investigational studies in severely anaemic patients in order to avoid the necessity of blood transfusions.

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